VME System Data Requests

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Introduction

One of the most important services provided by the VME system software is support for handling requests for data. Each VME station is able to respond to many active data requests simultaneously. Each request may ask for data to be returned repetitively at rates specified in sub-multiples of 15Hz. One-shot requests, in which only a single response is given, are also supported. This paper describes how requests for data are handled by a station on the network.

VME Station Data

Data which is collected by a station is kept in tables in memory. Most data requests call for copies of selected data from these tables. One of the most popular tables is the Analog Data Table. An entry in this table contains the most recent reading, setting, nominal and tolerance values for each channel known to that station. The entries are indexed by channel number. (A channel herein refers to a single analog quantity known to the system in its local database, another table of entries also indexed by channel number.)

Values of 16-bit readings are collected from the hardware at 15Hz, according to the instructions contained in the Data Access Table. The last setting value is recorded in the Analog Data Table upon successful setting of the associated control hardware, such as a D/A. The nominal and tolerance values are specified by the user and are used by the alarm scanning logic. That code checks new data readings against the nominal value within the specified tolerance to judge whether a channel is in a “good” state or a “bad” state. Each time a change of state occurs,

A common type of data request, then, is to request readings of a selected group of channels. The support for data requests is optimized to respond to repetitive requests for a given type of data from a random selection of table entry identifiers. The type of data of data is specified in a data request by a “listype” number. This is a small integer currently in the range 0-39. The table entry identifier is called an “ident.” It consists of a network node number followed by an entry number. So, the listype indicates the type of data requested, and the ident specifies which table entry to access.

In order to take advantage of the way the system is optimized to respond to requests, one should specify a listype and an array of idents for which that type of data is being requested. When updating the response to a request, the internal VME software works with an array of pointers, one pointer for each ident in the request. The array of pointers is processed according to code optimized to handle the particular type of data which is accessed using the specified listype.

The listype mechanism is actually somewhat more general than stated above. A listype number indexes into an internal table which contains a reference to code to generate the internal pointers which are used during response update, a reference to code which processes a setting (if allowed) for that type of data, and parameters which specify the table and entry offset appropriate for that listype. But it is possible for data to be accessed which does not come from simple table entries. For example, data may be requested from a serial port. In that case, the response data consists of a word containing the number of characters followed by that number of characters, limited to a maximum length as specified

number of lines of text is returned, where a line ends in a carriage return code.) Another example is a request for binary status data. One may request such data by using a listype which expects a list of bit number idents. In this case, the response consists of a single byte with the value of 0 or 1 for each bit number, according to the current state of the status bits as found in the Binary Data Table (the digital "analog" of the Analog Data Table), which contains the latest readings of the binary status data bytes.

Sources of Data Requests

VME stations can receive requests for data from several sources. Each station can support a local console application which may make requests by calling system procedures. The simplest case would request a list of data using only idents of the local node. The second case occurs when a local request includes idents which indicate a node number different from that of the local station. The local station software then issues the request to the network. If the array of idents includes idents from more than one "other" node, then the request is broadcast in order to reduce network traffic, at the expense of requiring all stations, not just those identified in the request, to examine the request. So, a network node may receive a request for data from another station who made the request. In this case, the station(s) examine the received request for idents which match their own station number, and they gear themselves up to respond only to their own part of the request. The requesting VME station, then, has the job of combining these "response fragments" into a single response for the requesting application

Data Server request to any VME sta
Such a request is treated internally
like a locally-generated request. It
consist of idents of any set of stations.
Data Server Task will collect the resp
fragments that are returned to its
and deliver them to the orig
requesting node. It is recommended
network efficiency reasons that the sta
chosen to be the serving station be or
the stations which is mentioned in
request, perhaps the node specified in
first ident mentioned in the request.

A fourth source for data requests is via
Serial Server. In this case, the reque
sent from a requesting computer to
serial input port of a VME station.
Serial Server then makes the req
locally. When the response fragments
collected and ordered, a serial respons
transmitted back out the serial port to
requesting computer.